## CLAIMS

1. A substrate processing chamber (200, 400) comprising: a substrate supporting member (214, 414) located within a pressure sealed vessel (202, 540); and a perimeter partition valve (PPV) (450) dispersed within said vessel, said PPV comprising: an essentially continuous perimeter sealing slide (252); an essentially continuous perimeter seal (254) within said slide; an essentially continuous perimeter sealing surface (255); and an actuator (464) for moving said sealing slide between an open position and a closed position; said processing chamber characterized by:

a perimeter gas distribution plenum (272);

a perimeter gas flow drift channel (280) in serial fluidic communication downstream from said gas distribution plenum; and

an inert gas supply port (288) in serial fluidic communication upstream from said gas distribution plenum;

an inert gas shutoff valve in serial fluidic communication upstream from said inert gas supply port;

said perimeter gas flow drift channel comprising an outer end (280a) and an inner end (280b);

said outer end is substantially proximate to said perimeter seal;

wherein said PPV confines a pressure sealed portion (201, 401) within said vessel when said perimeter sealing slide is actuated to said closed position; said pressure sealed is formed between said slide and said sealing surface using said seal; said pressure sealed portion comprising said substrate support member; and said PPV forms a perimeter access channel to said substrate support member when said PPV is actuated to said open position;

wherein said gas distribution plenum communicates a substantially unified flow of inert gas from said inert gas supply port to said outer end of said drift channel when said shutoff valve is open; and said drift channel further communicates said inert gas into said pressure sealed portion of said vessel when said shutoff valve is open.

2. The substrate processing chamber as in claim 1 further comprising:

a continuous sliding perimeter protection member (276);

Said sliding perimeter protection is attached to the inner side of said perimeter sealing slide;

said sliding perimeter protection member forms said perimeter gas flow drift channel (280) when said PPV is actuated to said closed position; and

said perimeter protection member substantially covers the inner portion of said perimeter sealing slide.

3. The substrate processing chamber as in claim 2 further comprising:

a stationary perimeter protection member (270); and

a substantially restricted perimeter gas distribution plenum is formed between said sliding perimeter protection member and said stationary perimeter protection member when said PPV is actuated to said closed position.

4. The substrate processing chamber as in claim 2 wherein said sliding perimeter protection member defines a portion of the inner wall of said process chamber; and

said sliding perimeter protection member forms a perimeter flow path with a substantially round top corner.

5. The substrate processing chamber as in claim 4 wherein said stationary perimeter protection member defines a portion of the inner wall of said process chamber; and

said stationary perimeter protection member forms a perimeter flow path with a substantially round bottom corner.

6. The substrate processing chamber as in claim 1 further comprising:

an outer perimeter seal (258) ;

a vessel perimeter sealing surface (259);

a lid (206);

a lid perimeter sealing surface (255);

said outer perimeter seal is dispersed within said slide;

said outer perimeter seal forms a pressure tight communication with said vessel perimeter sealing surface when said PPV is actuated to said closed position; and

said perimeter seal forms a pressure tight communication with said lid perimeter sealing surface when said PPV is actuated to said closed position.

Wherein said lid is removable providing access to said chamber and said perimeter seal; and

a pressure tight isolation between said chamber and said vessel is maintained when said PPV is actuated to said closed position and said lid is removed.

7. The substrate processing chamber as in claim 5 further comprising:

an outer perimeter seal (258) ;

a vessel perimeter sealing surface (259);

a lid (206);

a lid perimeter sealing surface (255);

said outer perimeter seal is dispersed within said slide;

said outer perimeter seal forms a pressure tight communication with said vessel perimeter sealing surface when said PPV is actuated to said closed position; and

said perimeter seal forms a pressure tight communication with said lid perimeter sealing surface when said PPV is actuated to said closed position.

Wherein said lid is removable providing access to said chamber and said perimeter seal; and

a pressure tight isolation between said chamber and said vessel is maintained when said PPV is actuated to said closed position and said lid is removed.

8. The substrate processing chamber as in claim 1 further comprising:

a substrate placement member (850);

wherein said substrate placement member is actuated to provide vertical substrate translation; and said actuated is substantially contained within said process chamber.

9. The substrate processing chamber as in claim 10 wherein said actuated comprising pneumatic actuation.

10. The substrate processing chamber as in claim 2 further comprising:

a substrate placement member (850);

wherein said substrate placement member is actuated to provide vertical substrate translation; and said actuated is substantially contained within said process chamber.

11. The substrate processing chamber as in claim 5 further comprising:

a substrate placement member (850);

wherein said substrate placement member is actuated to provide vertical substrate translation; and said actuated is substantially contained within said process chamber.

12. The substrate processing chamber as in claim 7 further comprising:

a substrate placement member (850) including a vertical substrate placement

actuator (890) for providing vertical substrate translation; said processing chamber characterized by said actuator being substantially contained within said processing space.

13. The substrate processing chamber as in claim 12 wherein said actuator comprises a pneumatic actuator (890) and wherein pressurizing said pneumatic actuator translates said substrate vertically up; and evacuating said pneumatic actuator translates said substrate vertically down.

14. A substrate processing chamber (354) comprising: an enclosed, sealable processing space (350); a substrate support member (364) and a substrate placement member (850) including a vertical substrate placement actuator (890) for providing vertical substrate translation; said processing chamber characterized by said actuator being substantially contained within said processing space.

15. The substrate processing chamber as in claim 14 wherein said actuator comprises a pneumatic actuator

16. The substrate processing chamber as in claim 15 characterized in that said a pneumatic actuator (890) comprises a bellows and pressurizing said bellows translates said substrate vertically up; and evacuating said bellows translates said substrate vertically down.

17. A substrate processing system comprising:

a substrate processing system vessel (540);

a substrate processing chamber (400); and

said processing system vessel comprising:

a pressure tight vessel space;

a top vessel plate (402);

a bottom vessel plate (404);

a top port (406);

a bottom port (407); and

said substrate processing chamber comprising:

a perimeter partitioned assembly (PPA) (520);

a lid assembly (560); and

said PPA comprising:

a substrate supporting member (414);

a PPV (450);

a perimeter PPV bonnet (451);

a substrate placement member (500);

a pumping port (426); and

an accessory port (444);

said lid assembly comprising:

a gas delivery manifold (408);

wherein said bottom port is formed within said bottom vessel plate of said processing system vessel and said top port is formed within said top vessel plate of said processing system vessel;

wherein said perimeter PPV bonnet is pressure sealed to said bottom port of said processing system vessel and said lid assembly is pressure sealed to said top port of said processing system vessel to form said substrate processing chamber.

18. The substrate processing system as in claim 17 wherein said substrate placement member is actuated to provide vertical substrate translation; and

said actuated is substantially contained within said process chamber.

19. The substrate processing system as in claim 17 wherein said processing system vessel further comprising a substrate translating member.

20. The substrate processing system as in claim 19 further comprising:

a load-lock chamber (710).

21. The substrate processing system as in claim 20 wherein said load-lock chamber comprising:

a bottom load-lock assembly; and

a top load-lock assembly;

wherein said bottom load-lock assembly is pressure sealed to said bottom port of said processing system vessel and said top load-lock assembly is pressure sealed to said top port of said processing system vessel to form said load-lock chamber.

22. The substrate processing system as in claim 19 wherein said substrate placement member is actuated to provide vertical substrate translation; and

said actuated is substantially contained within said process chamber.

23. The substrate processing system as in claim 20 wherein said substrate placement member is actuated to provide vertical substrate translation; and

said actuated is substantially contained within said process chamber.

24. The substrate processing system as in claim 21 wherein said substrate placement member is actuated to provide vertical substrate translation; and

said actuated is substantially contained within said process chamber.

25. The substrate processing system as in 22 wherein said processing is ALD.

26. The substrate processing system as in 23 wherein said processing is ALD.

27. The substrate processing system as in 24 wherein said processing is ALD.

28. The substrate processing system as in claim 19 wherein said substrate translating member comprising a substrate handling robot (780).

29. The substrate processing system as in claim 20 wherein said substrate translating member comprising a substrate handling robot (780).

30. The substrate processing system as in claim 21 wherein said substrate translating member comprising a substrate handling robot (780).

31. The substrate processing system as in claim 22 wherein said substrate translating member comprising a substrate handling robot (780).

32. The substrate processing system as in claim 23 wherein said substrate translating member comprising a substrate handling robot (780).

33. The substrate processing system as in claim 24 wherein said substrate translating member comprising a substrate handling robot (780).

34. The substrate processing system as in claim 19 wherein:

said processing system comprising a plurality of said processing chambers;

said substrate translating member comprising a multiple lever rotation member (1270);

said multiple lever rotation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the number of said plurality of processing chambers; and

said substrate translating comprising:

sequentially rotating all of said substrates in one direction; and

sequentially processing all of said substrates.

35. The substrate processing system as in claim 20 wherein:

said processing system comprising a plurality of said processing chambers and a plurality of said load-lock chambers;

said substrate translating member comprising a multiple lever rotation member (1162);

said multiple lever rotation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the sum of the number of said plurality of processing chambers and said plurality of load-lock chambers; and

said substrate translating comprising:

sequentially rotating all of said substrates in one direction (1156);

sequentially processing all of said substrates within said processing chambers; and

handling said substrates within said load-lock chambers.

36. The substrate processing system as in claim 21 wherein:

said processing system comprising a plurality of said processing chambers and a plurality of said load-lock chambers;

said substrate translating member comprising a multiple lever rotation member (1162);

said multiple lever rotation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the sum of the number of said plurality of processing chambers and said plurality of load-lock chambers; and

said substrate translating comprising:

sequentially rotating all of said substrates in one direction (1156);

sequentially processing all of said substrates within said processing chambers; and

handling said substrates within said load-lock chambers.

37. The substrate processing system as in claim 22 wherein:

said processing system comprising a plurality of said processing chambers;

said substrate translating member comprising a multiple lever rotation member (1270);

said multiple lever rotation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the number of said plurality of processing chambers; and

said substrate translating comprising:

sequentially rotating all of said substrates in one direction; and

sequentially processing all of said substrates.

38. The substrate processing system as in claim 23 wherein:

said processing system comprising a plurality of said processing chambers and a plurality of said load-lock chambers;

said substrate translating member comprising a multiple lever rotation member (1162);

said multiple lever rotation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the sum of the number of said plurality of processing chambers and said plurality of load-lock chambers; and

said substrate translating comprising:

sequentially rotating all of said substrates in one direction (1156);

sequentially processing all of said substrates within said processing chambers; and

handling said substrates within said load-lock chambers.

39. The substrate processing system as in claim 24 wherein:

said processing system comprising a plurality of said processing chambers and a plurality of said load-lock chambers;

said substrate translating member comprising a multiple lever rotation member (1162);

said multiple lever rotation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the sum of the number of said plurality of processing chambers and said plurality of load-lock chambers; and

said substrate translating comprising:

sequentially rotating all of said substrates in one direction;

sequentially processing all of said substrates within said processing chambers; and

handling said substrates within said load-lock chambers.

40. The substrate processing system as in claim 19 wherein:

said processing system comprising a plurality of said processing chambers;

said plurality of processing chambers is substantially arranged on a single line;

said substrate translating member comprising a multiple lever linear translation member;

said multiple lever linear translation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the number of said plurality of processing chambers; and

said substrate translating comprising:

sequentially translating all of said substrates in one direction; and

sequentially processing all of said substrates.

41. The substrate processing system as in claim 20 wherein:

said processing system comprising a plurality of said processing chambers and two of said load-lock chambers;

said plurality of processing chambers is substantially arranged on a single line;

said load-lock chambers are arranged to be first and last within said line;

said substrate translating member comprising a multiple lever linear translation member;

said multiple lever linear translation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the sum of the number of said plurality of processing chambers plus two; and

said substrate translating comprising:

sequentially translating all of said substrates in one direction from said first to said last; and

sequentially processing all of said substrates within said processing chambers;

placing a substrate in said first load-lock chamber; and

removing a substrate from said last load-lock chamber.

42. The substrate processing system as in claim 21 wherein:

said processing system comprising a plurality of said processing chambers and two of said load-lock chambers;

said plurality of processing chambers is substantially arranged on a single line;

said load-lock chambers are arranged to be first and last within said line;

said substrate translating member comprising a multiple lever linear translation member;

said multiple lever linear translation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the sum of the number of said plurality of processing chambers plus two; and

said substrate translating comprising:

sequentially translating all of said substrates in one direction from said first to said last; and

sequentially processing all of said substrates within said processing chambers;

placing a substrate in said first load-lock chamber; and

removing a substrate from said last load-lock chamber.

43. The substrate processing system as in claim 22 wherein:

said processing system comprising a plurality of said processing chambers;

said plurality of processing chambers is substantially arranged on a single line;

said substrate translating member comprising a multiple lever linear translation member;

said multiple lever linear translation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the number of said plurality of processing chambers; and

said substrate translating comprising:

sequentially translating all of said substrates in one direction; and

sequentially processing all of said substrates.

44. The substrate processing system as in claim 23 wherein:

said processing system comprising a plurality of said processing chambers and two of said load-lock chambers;

said plurality of processing chambers is substantially arranged on a single line;

said load-lock chambers are arranged to be first and last within said line;

said substrate translating member comprising a multiple lever linear translation member;

said multiple lever linear translation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the sum of the number of said plurality of processing chambers plus two; and

said substrate translating comprising:

sequentially translating all of said substrates in one direction from said first to said last; and

sequentially processing all of said substrates within said processing chambers;

placing a substrate in said first load-lock chamber; and

removing a substrate from said last load-lock chamber.

45. The substrate processing system as in claim 24 wherein:

said processing system comprising a plurality of said processing chambers and two of said load-lock chambers;

said plurality of processing chambers is substantially arranged on a

single line;

said load-lock chambers are arranged to be first and last within said line;

said substrate translating member comprising a multiple lever linear translation member;

said multiple lever linear translation member comprising:

equally spaced number of substrate pickup levers;

said number of levers equals the sum of the number of said plurality of processing chambers plus two; and

said substrate translating comprising:

sequentially translating all of said substrates in one direction from said first to said last; and

sequentially processing all of said substrates within said processing chambers;

placing a substrate in said first load-lock chamber; and

removing a substrate from said last load-lock chamber.

46. The substrate processing system as in claim 28 wherein said system is attached to a wafer handling chamber (1298); and

said attached comprising:

a slit formed in the wall of said pressure tight vessel space; and

a slit valve (1292) forming a pressure tight communication with said processing system and said wafer handling system;

47. The substrate processing system as in claim 31 wherein said system is attached to a wafer handling chamber (1298); and

said attached comprising:

a slit formed in the wall of said pressure tight vessel space; and

a slit valve (1292) forming a pressure tight communication with said processing system and said wafer handling system;

48. The substrate processing system as in claim 34 wherein said system is attached to a wafer handling chamber (1298); and

said attached comprising:

a slit formed in the wall of said pressure tight vessel space; and

a slit valve (1292) forming a pressure tight communication with said processing system and said wafer handling system;

49. The substrate processing system as in claim 37 wherein said system is attached to a wafer handling chamber (1298); and

said attached comprising:

a slit formed in the wall of said pressure tight vessel space; and

a slit valve (1292) forming a pressure tight communication with said processing system and said wafer handling system;

50. The substrate processing system as in claim 40 wherein said system is attached to a wafer handling chamber (1298); and

said attached comprising:

a slit formed in the wall of said pressure tight vessel space; and

a slit valve (1292) forming a pressure tight communication with said processing system and said wafer handling system;

51. The substrate processing system as in claim 43 wherein said system is attached to a wafer handling chamber (1298); and

said attached comprising:

a slit formed in the wall of said pressure tight vessel space; and

a slit valve (1292) forming a pressure tight communication with said processing system and said wafer handling system;

52. The substrate processing system as in claim 51 wherein said multiple lever linear translation member comprising:

a first set of levers;

a second set of levers;

said first set of levers and said second set of levers are spaced to substantially match the center to center distance between said process chambers;

said levers are translatable forward and backward in the direction of said single line;

wherein sequentially translating all of said substrates comprising:

removing a completed substrate from a last processing chamber

elevating said substrates using said substrate placement member;

moving first set of levers backwards to substantially locate under said substrates;

moving second set of lever forwards substantially locate under

said substrates;

lowering said substrates using said substrate placement member;

translating said substrates forwards to the next said processing chamber by moving said first set of levers and said second set of levers concurrently;

Moving said first set of lever forward and moving said second set of levers backwards to substantially locate between said processing chambers; and

Loading a substrate into a first processing chamber.

53. The substrate processing system as in claim 44 wherein said multiple lever linear translation member comprising:

a first set of levers;

a second set of levers;

said first set of levers and said second set of levers are spaced to substantially match the center to center distance between said process chambers;

said levers are translatable forward and backward in the direction of said single line;

wherein sequentially translating all of said substrates comprising:

removing a completed substrate from said last load-lock chamber

elevating said substrates using said substrate placement member;

moving first set of levers backwards to substantially locate under said substrates;

moving second set of lever forwards substantially locate under said substrates;

lowering said substrates using said substrate placement member;

translating said substrates forwards to the next said processing chamber by moving said first set of levers and said second set of levers concurrently;

Moving said first set of lever forward and moving said second set of

levers backwards to substantially locate between said processing chambers; and

Loading a substrate into said first load-lock chamber.

54. A method for improving the safety of substrate placement members within a processing chamber comprising:

containing said wafer placement member within said processing chamber;

containing the pneumatic actuator of said wafer placement member within said processing chamber

actuating said wafer placement member within said processing chamber;

said actuating comprising:

pressurizing said actuator to elevate said substrate placement member; and

evacuating said actuator to lower said substrate placement member.